

The Industry-University Connection in North Carolina

We should expect some correlation between the strength of university-based research and the state's industrial base. On the one hand, economists have demonstrated that footloose knowledge-based industries tend to seek locations close to appropriate knowledge resources. Silicon Valley developed as a site of high tech research, in part, because of the proximity to Stanford University. Similarly, surveys indicate that firms have located in the Research Triangle region to be close to labs, expertise, and a well-trained professional labor force from the area's universities.

The causality between industry base and university strength goes in the other direction too, however. Existing industries often contribute equipment, research funds, unrestricted resources, and professional expertise

to local universities. In addition, footloose academic researchers specializing in a technology area like to be located near the pertinent industry cluster. It is not surprising, then, that UNC-CH, Duke, and NCSU have grown in national stature in science and technology areas during the past several decades, while the industry base in the Triangle was deepening.

The correlation between university and industry strength can be seen by comparing information contained in different parts of this report. The strongest disciplines, by any of the scoring methods used, can be arranged into broad research clusters. The following four research areas stand out as current or emerging disciplinary strengths in North Carolina. The groupings are not meant to be exact; some related disciplines are omitted and there is some double

counting. They are intended primarily to provoke critical thinking about the condition and potential of North Carolina's R&D enterprise.

Not surprisingly, there are industry clusters in these same three areas. Table 14 illustrates the concentration of industries in the areas of academic strength, considering the three ways industrial strength was measured. Other research strengths in the state may be added to this framework, including the strong presence of environmental research and consulting firms (including the Environmental Protection Agency) as well as contract research organizations and the National Institute of Environmental Health Sciences.

Another indicator of the dynamic link between industries and universities is the incidence of spin-offs from universities (of course, there are also spin-offs from other businesses). Our research identified a total of 32 high-technology spin-offs from North Carolina universities between 1972 and 1997 (Table 15). Sixteen of those taken place since 1991, implying a considerable increase in spin-off activity in recent years, though trend is difficult to assess since older spin-offs are more difficult to identify. Unsurprisingly, the state's three largest research universities, UNC-CH, Duke, and NCSU, generated almost all the spin-offs, and most were located in the Research Triangle area.

CLUSTER 1: Electronics and related (electrical engineering, materials science, computer sciences).

CLUSTER 2: Life sciences and related (cell and development biology, biochemistry and molecular biology, pharmacology, physiology, molecular and genetic sciences, neurosciences, chemistry, biomedical engineering).

CLUSTER 3: Other chemicals (chemistry and chemical engineering).

CLUSTER 4: Environmental (geosciences, oceanography, and ecology/evolution and behavior). ■